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UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW HAMPSHIRE

MARKEM CORPORATION, Plaintiff,	
v.	07-cv-06-PB May 29, 2008 9:40 a.m.
ZIPHER LTD., et al., Defendant.	

TRANSCRIPT OF CLAIMS CONSTRUCTION HEARING
BEFORE THE HONORABLE PAUL J. BARBADORO

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IN OPEN COURT

THE CLERK: The Court has for consideration this morning Civil Action 07-cv-6-PB, Markem Corporation versus Zipher Ltd., et al., for a claims construction hearing.

THE COURT: How do you want to proceed?

MR. GLITZENSTEIN: Good morning, your Honor. Kurt Glitzenstein for plaintiff Markem Corporation. Your Honor, at the status conference that we had last February, we had talked about proceeding first with a tutorial in order to help orient the Court to some of the technical issues and the context for the claim construction issues. So our proposal on this proceeding today would be to start with that, and for that we have here today Dr. Pedro Landers, Peter Landers, from Markem Corporation to address some of those issues, and then once we have gotten through that and defendants have a chance to respond, then we would proceed to the claim construction issues, the argument section of the proceeding.

MR. JAKES: Your Honor, that's fine with us. We also have someone here to help us with the tutorial, Professor Kuc from Yale University is here, and he would respond after Markem's witness.

THE COURT: All right. I probably explained

my view about Markman hearings to you at the last conference, but let me reiterate. I think that it is a mistake for judges to offer interpretations of claim language that the judge doesn't need to offer to decide the dispute and, in fact, I think that I'm constitutionally constrained not to do that. I have the power to decide cases and controversies. I don't have the power to offer advisory opinions. So unless somebody explains to me today why the dispute between the parties concerning the construction of a particular term is potentially determinative of the case, I'm not going to construe the term. So I hope that you will be prepared to do that, and the way to do that, obviously, is to show me what the allegedly infringing product is, and why, if one party's construction is adopted, it doesn't infringe, and why, if the other party's construction is adopted, it does, and unless you can really do that, I probably won't give you an answer to your question and I will focus only on those terms that I think will decide the case. If they won't decide the case, I'm not going to give you an interpretation.

I also have to tell you, and I looked at several of your disputes, they don't seem to me to be real disputes. So I'm not going to adopt Version A over Version B when I don't see any difference between

Version A and Version B. So unless somebody can demonstrate to me that there's a meaningful distinction between the two terms, you're not going to get an instruction on this. So as you go through this, just be prepared on those points. Otherwise, you won't get what you're hoping to.

MR. JAKES: We're prepared on that, your Honor.

THE COURT: All right. You want to call your person?

MR. GLITZENSTEIN: Yes, your Honor. Thank you. Your Honor, we've asked Dr. Pedro Landers of Markem whose title is the Director of Product Development to provide the Court with some background information about the two products in this case.

THE COURT: How would you like to do it? You can sit there, you can stand up, you can sit at the witness stand, whatever you want to do.

MR. GLITZENSTEIN: We've got a little presentation that will include some videos and some other graphics just to sort of supplement Dr. Pedro's discussion this morning. We're comfortable doing it in any way. I think Dr. Landers is probably more comfortable standing on his feet and sort of expounding on these issues.

THE COURT: That's fine.

MR. GLITZENSTEIN: But we do have a little bit of show and tell here in terms of some ribbon and some printers in addition to the video; so it might be a little bit challenging for everybody to see what's going on. So what I would suggest we do is start out with the camera here and see if that works and maybe flip between the camera and the Powerpoint presentation that we have got if that's possible.

THE COURT: Yep. Okay. Perfect.

MR. GLITZENSTEIN: Let's do that then.

THE COURT: Go ahead.

MR. LANDERS: Good morning, your Honor. Peter Landers, Director of Product Development at Markem Corporation. I was formerly the Engineering Manager of the Markem Corporation in Nottingham UK and was responsible for the projects to develop the SmartDate5 and the 18 Series. Prior to that I had various positions in what would probably be best described as automation industry, both as a practicing engineer and as an engineering manager. So that gives you my background relative to the accused products.

So what I would like to do is, firstly, take you through very quickly the context of thermal transfer over-printing world just to give you some background,

place it in the industry that it is founded in, and I'd like to give you some views of the machines.

So, firstly, I would like to show what thermal transfer over printer actually shows.

THE COURT: Let me make sure I've got everything enabled correctly. So if you want something from the document camera to be shown, if you'd tell me I'd like to enable the document camera, I can do that. Otherwise, I will stick with what's on the screen now which is the part from the laptop and is part of the tutorial. Do you want the document camera on now?

MR. LANDERS: Document camera, please.

THE COURT: All right. Make sure I've got this. All right.

MR. LANDERS: So shown on the document camera for everyone other than --

THE COURT: That one, let me turn -- Joyce, is that one actually turned on?

THE CLERK: Yes, it is.

THE COURT: So we've got to turn the jury box on.

MR. LANDERS: So thermal transfer over-printing is the process of adding variable data to pre-prepared packaging material typically in food and other fast-moving consumer goods industries. More often

than not, the variable data is a manufactured date or a use by date. That's hence the term over-printing. We don't print on a completed bag as I'm showing on the camera there. Rather, printing is done on the packaging material which is provided in roll format.

I've got a small part here and I've got some more if you want to hand that up. Each section is a separate packet, and we print immediately before this material gets folded into a packet around in this case a self-fed roll. So that is really what over-printing is.

Can we go back to the presentation now.

THE COURT: Yes.

MR. LANDERS: Probably to put the whole thing in context, it would be -- I've got a short video showing a SmartDate5 operating in an adjusted environment, and this really shows the environment in which these printers work. They are not desktop printers. They are industrial devices.

If you could run the video, Peter. So you can see here the substrate at the top of the screen being fed through the machine and the thermal transfer printer is printing upwards. I have some further videos to show the detail workings. This is much more to show context. So that gives you the context. I can move on?

MR. GLITZENSTEIN: Yes.

MR. LANDERS: Okay. So what I now want to do is look at the three accused products. The SmartDate 5 hardware-wise, both versions are the same. This is a current version which has a different sort of thermal mode in it, and as you can see it matches the machine in the video. Because of the construction of this machine, it's rather hard for me to show you the elements of the printer. So I will then proceed to the 18 Series which, hopefully, fits on the camera and I can take you through the elements of the printer. If you can switch the camera, please. Zoom out.

Okay. We have the front of the thermal transfer printer which you can see two spools, the supply spool and a take-up spool, and the ribbon goes from the supply to the take-up via a movement roller here, a dancing arm which acts as a tension sensor which is moved by the tension in the ribbon and on the rear.

THE COURT: Let me come down and look at it directly, and everyone else can look at it on the monitor but just speak up loud enough so the court reporter can hear you.

MR. LANDERS: So tension sensor is forward by a dancing arm which has a sensing element with a full effect sensor on the rear. The ribbon then passes around the thermal transfer print head which can be

advanced to meet up with the packaging material as it goes by, and that thermal printer transfer head transfers ink from the ribbon onto the substrate, the packaging material. It's a one-use ribbon so all the ink is transferred unlike, for example, a typewriter ribbon. That's probably not a good analogy anymore. The ribbon is then passed around two more passive rollers to the take-up.

THE COURT: How does this sense tension?

MR. LANDERS: The tension in the ribbon moves the dancing arm, rotates the dancing arm around that pivot, and hidden away, unfortunately, is a tension sensor which is made up of magnets that holds that sensor that measures the displacement to the magnet from that sensor which is then sensed by the electronics in the controller. So as the tension -- I can wind tension in, you'll see the sensor move.

THE COURT: All right.

MR. LANDERS: If you'd like to stand I can show you the same features on the SmartDate 5. It is just not as simple because they are separated between a cassette which is provided for easy loading of the ribbon and supply, take-up, passes around a series of rollers, one of which is a movement roller equivalent to the 18 Series, but also around a roller that can move up

and down in response to the tension in the ribbon that interacts with the sensor in the body of the printer, which is a small plunger here. That roller comes in contact so it can sense the movement of that roller and, likewise, there is a print head that can be displaced to affect the printing.

THE COURT: All right. Anything else you want me to see while I'm here?

MR. LANDERS: I think everything else is probably able to be seen from a distance.

THE COURT: All right.

MR. LANDERS: Thank you. So that is the printer side. Obviously, the other part of the equation is the film transfer ribbon itself. As you can see when I was showing the printers, it is a thin shape with an ink coating, and this is stretched between rollers and between the spools, and as you can see the -- it's plastic. There is some elasticity in this ribbon. If you apply too much tension, it will deform and eventually it will break. So that just shows you the ribbon.

Yeah, could we please go back to the -- next line, please. Now, what I would like to now show you is the detailed operations of a SmartDate 5. I've taken two short training videos that we have generated to show

the detail operations of this. It's easier than seeing it statically on the physical printer. I need to explain a slight complication in that there are two modes of operation, one where the substrate -- the packaging material is stopped between -- while the goods are being packaged, and we take advantage of that stationary period to print, and that is called intermittent mode. So if you could run the video, please, Peter.

What we have here -- so we have here -- rather than the packaging machine, we have the printer mounted in a test rig. The white material is equivalent to the packaging material, and we can see that the printer is printing, and what we've done for clarity is to cut away the metal in the front, and you can see the two ribbon spools rotating and then the print head moving to form the image, and then the spools are rotated again to move fresh ribbon -- remember, it's a one-strike ribbon -- into place for the next image, and you can see here the image has been placed down and there is the waste ribbon being taken away. You can just about see the negative image of the print on the waste ribbon.

THE COURT: This device uses two stepper motors that operate in a push/pull mode?

MR. LANDERS: That's correct. One step motor

for the supply spool, one for the take-up. Would you like to see anything on that again or should I go on to the continuous?

THE COURT: You can go ahead.

MR. LANDERS: Okay. Could we go to the next video. In continuous mode, the packaging machine does not stop the substrate during the packaging and, therefore, we have to print on the material as it moves. So the same rig, this time the packaging material is going over a roller and the printing cycle when we get the metal cut away is complicated by the fact that we need to accelerate the ribbon to match the speed of the packaging material, which means we overwind the ribbon and we have to wind it back at the end of each print cycle to make sure that we minimize the use of ribbon.

THE COURT: What do you mean to overwind the ribbon?

MR. LANDERS: You have to accelerate and de-accelerate the ribbon to match the substrate speed, which means you have used up more ribbon than the actual --

THE COURT: Oh, you're going back over the unused portions again.

MR. LANDERS: But you have to wind it back so the unused portion is immediately opposite the print

head when you do the next print so you minimize, again, wasting ribbon.

So that's showing the operation of the two printers. So I think that's really the background of the print cycle. Any other questions you have on that before I proceed?

THE COURT: No. Okay.

MR. LANDERS: So as you previously asked, both the ribbon drive motors are stepper motors. Stepper motors turn in discreet steps and, therefore, sweep out a fixed angle for each step when it's commanded to by the controller.

Now, this has the consequence that a different -- for each phrase, specific number of steps, depending on the diameter of the spool rolls, you will get a different amount of ribbon fed, and we have a diagram here to show that, but, for example, a nearly empty roll of ribbon, one revolution will feed that much ribbon (demonstrating) for a -- in this case nearly full. One roll feeds that much ribbon.

THE COURT: Is the way a stepper motor operates, is the arc that's affected by each step, it's constant for that motor and it can only operate by going one degree or whatever?

MR. LANDERS: For that motor and control

configuration, yes. It's baked into the design. So different motors can have different step angles, but also you can choose to step --

THE COURT: You can't adjust the step angle -- once you've developed your stepper motor, that same motor for part of the time go one degree and another time go half a degree. It just goes in a series of constant degree steps.

MR. LANDERS: Yes. For all intents and purposes, yes. So you get with the SmartDate 5 ribbon, which is a full roll, somewhere around a hundred millimeters diameter, and the empty roll is somewhere around 33 millimeters diameter. You'll get a three to one variability in the amount of ribbon fed. So if we think back to the video, we are winding the ribbon from one spool to the other and, obviously, to maintain the ribbon taut, we need to wind the same amount out of one spool onto the next.

So if we can go to the next slide.

What I'm showing here is that if we have different diameter spools, which we will have other than at one point in the middle of a roll of ribbon, we need a different number of steps to effect the same length of ribbon, and when we are feeding that ribbon, for example, here we've chosen ten millimeters, for a small

diameter roll we will need 200 steps. For a larger diameter roll we will only need 70 steps. But to keep the ribbon in sync, not only do we need to change the number of steps, but we also need to ensure that the step break is such that they stay in sync so that even though we are doing 200 steps on one, 70 steps in the other, we are doing that in the same time. So just to feed ribbon we are talking about 200 steps in whatever time, say one second for the small roll and 70 steps in that one second, and that isn't a good time period, but it's a time period for the other one, and they start and they stop at the same time so that they are feeding and taking up exactly the same amount of ribbon as they go through. So that I think addresses stepper motor operation.

Now, to make sure that we can do that, we need to basically maintain a measure of the diameter which in our industry job it is called the RSR, Ribbon Step Ratio. So we maintain a figure that's mapped between the number of steps and distance of tape fed so that we are always getting the right amount of ribbon fed. However, that being said, it's a very nice theoretical model, but we are dealing with real world things, and I think you folks saw from the first video it's an industrial environment. The rolls are not always

treated as well as they should be.

THE COURT: What is the source of the variability? Is it the product quality is different and so it stretches not in a uniform way?

MR. LANDERS: There are a multitude of variations. The first thing is that the take-up spool itself is taking up ribbon that's been printed on. So there is a variability there. The rolls as supplied are not always symmetrical. There may be some eccentricity in it. But much as we always say in our manuals not to do it when the ribbon breaks because they've had a problem on the line, the quickest way for an industrial operator on these lines to join the tape is to tie a knot in it, and as you can well imagine, that does not give you a very even wind on the ribbon.

THE COURT: What do the instructions say? Throw out the spool?

MR. LANDERS: Do not tie a knot in the ribbon. These are industrial people, and the fact that we put it in our manual means we know full well that that's the temptation for everyone to do and my engineers do it all the time.

THE COURT: Is there a way to deal with the problem other than to just pull the spool off and discard it and put a new one on, an acceptable way to

deal with it?

MR. LANDERS: That isn't considered acceptable because it's too expensive. Use of tape for packaging is frowned upon. But that isn't the only disturbing find. There are reasons that we just don't get it right, and that being the crudest. So we need to --

THE COURT: So you can't just run this by measuring how much tape goes through and using a formula to figure out exactly how many steps you need to have to compensate for the different radiuses of the spools?

MR. LANDERS: That's correct. That's exactly the message I'm trying to get across is that there are things in the real world that disturb that mathematical nicety.

So, typically, systems that work in this way have to correct for these inaccuracies, and typically these inaccuracies are identified by a change in the tension of the tape or the ribbon. So that if you have the wrong amount of ribbon fed from one taken up by the other, it will increase or decrease the tension in the ribbon. So that's how typically systems would see the errors in the tape.

So we've -- I've put the machines down but pick up 18 Series again. I pointed out the tension

sensor. Now this probably puts it into context. You can see if we increase the tension, you have a physical effect on the machine that can detect that error in feeding the tape.

THE COURT: Let me ask you this. You've identified one circumstance in which the tension may vary, and what you are really telling me is that when the radius in the take-up spool differs from what would be ideal for a variety of reasons, the tension will differ.

MR. LANDERS: Correct.

THE COURT: So why not just measure the radius of the take-up spool periodically and mathematically derive a measurement of tension that should be there and make the corresponding adjustment as to how much tape needs to be added or subtracted?

MR. LANDERS: As you can see, the thickness of the ribbon is very thin; so you would need to measure to quite a high degree of accuracy.

THE COURT: Well, for example, there was discussion about an optical scan, something like that. You could use something like that, couldn't you, to very precisely measure the radius of the take-up spool?

MR. LANDERS: Not to the degree of precision that just one little bit -- one thickness of tape would

make a difference. The tape is about eight micron thick, the normal tape.

THE COURT: Depends on what your acceptable limits of tension are. If you're saying that they're very small, then your point makes sense. If the acceptable limits of tension are not very small, they are quite wide, then a gross measurement of radius may be sufficient.

MR. LANDERS: The acceptable level of tension is quite wide, but we -- the chosen method has been to look at tension because that's an easier measurement than, for example, the optical.

THE COURT: How does your tension sensor actually work? Tell me about how does it actually sense tension?

MR. LANDERS: It looks at the force applied to a mechanical roller and measures how that force -- what that force is.

THE COURT: Excuse my ignorance on this. I think of tension as a reactive force, and if you are then trying to measure it, I'm trying to think of how that sensor you have on there actually measures that reactive force.

MR. LANDERS: It just senses the displacement of the -- in the case of the 18 Series, which is the

most graphic, the dancing arm around its pivot.

THE COURT: How far it moves can be equated with a measure of tension that's on the tape?

MR. LANDERS: Exactly, yes. And on the SmartDate 5 there is a piece of electric force sensor which moves by a smaller amount but still moves, and that movement is measured by the sensor. So it's a force against a spring and the displacement.

THE COURT: Some kind of a formula when there is that kind of displacement that that is the measure of tension.

MR. LANDERS: Exactly. Okay. So I think what I would like to now do is to move on to just go through this tension correction system and I will start with the original SmartDate 5 which does it different from the current SmartDate 5 and the 18 Series.

Now, I think you had seen from the videos that the printer stops while it's waiting for the next bag to be in the right position. So there is a period when we are not printing, we are not winding ribbon; so that the ribbon system is stationary. At that point on both the -- all the SmartDate 5 and the 18 Series we measure the tension in the ribbon with the sensor we've discussed. Now, we now have a tension in the ribbon. We compare that with the target tension and generate a tension

error value.

If I can have the next slide. Now, this is on -- the initial version of the SmartDate 5 is then compared with a dead band, historicist band to say do we need to make any corrections to the tension.

THE COURT: Can I ask you an unrelated question? I'm trying to make sure I understand stepper motors, which I had no familiarity with before this case. If you had the stepper motor going, but you're in one of these stopped modes where tape isn't moving, and I were to try to take my hand and turn the spindle, could I turn the spindle on the stepper motor?

MR. LANDERS: No.

THE COURT: And why can't I?

MR. LANDERS: Because there is still a force to hold the spindle in place.

THE COURT: If we remove the power from the stepper motor and I attempt to turn the spindle, could I turn the spindle?

MR. LANDERS: Yes, there is a residual magnetic, what's called the D10 force; so because of the magnetic nature of the motor, you will feel each step but you would be able to on a normal stepper motor overcome that force.

THE COURT: I would or wouldn't?

MR. LANDERS: You would.
THE COURT: I would.
MR. LANDERS: But with power applied it is held in that position.
THE COURT: So energizing the motor has the effect of applying some kind of resistance to the spindle so I couldn't turn it easily?
MR. LANDERS: It holds the spindle in place up to a certain force. And with the step motors on these printers, if you have a full roll of ribbon, you can overcome that, but to all intents and purposes it is held stationary.
THE COURT: And if that were not true, what would happen to the tension on the tape between the movements of the stepper motor?
MR. LANDERS: It would relax to zero force. As I said, there is a residual magnetic --
THE COURT: So that the capacity of the stepper motor to maintain that resistance is vital to keeping the tension on the tape at a predetermined level. Even if it's not stepping, that it's standing still, it's required to maintain a particular tension level.
MR. LANDERS: It's required to hold the tension to the level it was set before, yes. Once you

stop the motor, the tension is held.

THE COURT: If you pulled the plug on the thing and then tried to measure the tension at that point, it would be only whatever that magnetic force that you talked about, the residual magnetic force.

MR. LANDERS: To all intents and purposes, slack.

THE COURT: Okay. Sorry. Go ahead.

MR. LANDERS: So we've measured the tension while the printer is not active and created this error signal, and we've compared it with the historicist band and said if it's within this particular band, we will not bother to make a correction because the tension's okay. If it's outside that band, we will make a correction. We'll make that correction by just feeding the tension error into an algorithm, a control algorithm and calculate that we need to correct tension.

THE COURT: And it's through some combination of steps on both motors that you would make a tension adjustment?

MR. LANDERS: Just simulate that, yeah. So we make that calculation that we need to adjust the tension. If you could go back one slide.

So for example, if we use this scenario, the determination of the algorithm would be -- for example,

we have a tension error and then we wish to add four steps to the stepping motor that's got the small diameter. So we would want to move the small diameter motor by 204 steps and maintain the motion of the larger diameter of the 17 steps.

The way that this system is set up, we made that correction on one motor and both motors will move to move the tape to the fresh ribbon position. One motor will stop and the motor with the added steps will continue to feed in the correction.

THE COURT: All right.

MR. LANDERS: So again, on the early version of the SmartDate 5, the original version, the calculation of the number of steps takes account of the radius of the spool so that we -- no matter what the state of use of the ribbon roll, we would endeavor to feed the same length of tape for a given tension error signal. So that calculation uses the known or estimated radius of the ribbon spools to make that calculation. So really, that describes the tension control for the original version of the SmartDate 5.

Now for the current version of the SmartDate 5 there are two very specific differences. The first difference is that there is no green band. If we could go to that graphic. There is no do nothing zone.

Whatever the tension error is, we will do the calculation, and in the very rare occasion that the tension is actually exactly right, the calculation will come up as zero steps, but the normal mode is that we always calculate some steps to correct the tension.

The second difference, and if we could go back two slides please, we do not take account of the diameter of the ribbon. We just calculate a number of steps. So for a given error in tension, we will have for a nearly empty spool one length of tape fed, but for the same tension error, the correction with the larger spool would be anything up to three times the size of that correction. So those are the two key differences, no green band, no dead zone, and tension correction is not modified for the diameter of the ribbon spools.

THE COURT: In the original version it's not and in the newer version it is?

MR. LANDERS: In the original version we take account of diameter and it has a dead band. In the new version it has no dead band, no historicist band, and no account is taken on --

THE COURT: Why don't you account for the diameter of the spool in the new version?

MR. LANDERS: It was an unnecessary complication. The accuracy is -- of the whole system is

such that it didn't make the system any better. So we took it out.

THE COURT: All right. Theoretically, you would think it would make it better?

MR. LANDERS: Yes, but as we discussed earlier, there are a number of disturbing factors. It's an unideal system. So the control system isn't that accurate and therefore this was, you know, like the classic school boy error of adding all those significant digits to the mathematical equation when they aren't really applicable. They're not significant. So it just didn't help; so we took it out.

Of the 18 Series we never had a dead band, and that was one of the prompting to take it out of the SmartDate 5. People who generated the control algorithm did not put that in and it wasn't necessary. However, we do correct for the radius of the ribbon on the 18 Series.

So I think that really sort of gives you what I wanted to present. Can I answer any questions for you?

THE COURT: Some things may come up but not at the moment. I'd rather take my -- initially address my more pointed questions to counsel and then you can fill in.

MR. LANDERS: Thank you. I'm very grateful for that.

THE COURT: Do you want to have your expert -- do you have more to present by way of this tutorial, or do you want the other side to present now?

MR. GLITZENSTEIN: The latter, your Honor. We don't have anything additional on the tutorial.

THE COURT: Do you want to have your expert say something in addition to what's been said?

MR. JAKES: Yes, your Honor, if we could, please. Professor Roman Kuc is here. Professor Kuc may be more comfortable up on the witness stand.

THE COURT: That's fine. Yeah, whatever.

(Professor Kuc took the stand, not sworn.)

MR. JAKES: We are not going to do this strictly as a Q and A, but I have a few prompts to get Professor Kuc going. Professor Kuc, could you introduce yourself to the Court.

PROFESSOR KUC: Good morning, Your Honor. I'm Roman Kuc. I'm a Professor of Electrical Engineering at Yale University. I'm also the Director of the Intelligent Sensors Laboratory, and I'm also the Associate Dean of Engineering Education and Engineering.

So my background in stepper motors is that I've done -- I've taught courses in how to design robots

with stepper motors, mobile robots where position is very important, robot arms where positioning is very important. I teach courses at different levels. I teach courses to non-science majors on how technology works, how information is stored digitally. I teach courses on how to use micro-controllers to control robots and actually motors, read data from sensors. I teach senior projects where electrical engineers use stepper motors to control robot arms, do particular tasks, and I also do -- advise senior students on theoretical topics as well.

My background is I have a Bachelor of Science in Electrical Engineering from Illinois Institute of Technology. After finishing that degree, I joined Bell Laboratories, and then after Bell Laboratories I went to finish my degree at Columbia University for Ph.D. and then came to Yale where I've been for about 30 years.

One of my first projects at Bell Laboratories was to design a tape drive system, magnetic tape system to store data, and that tape system encapsulated very fast manipulation of the tape, speeding it up, slowing it down, positioning it so you could read the data reliably.

Prior to that, during high school, I also repaired typewriters, and one brand of typewriter used

tape film very similar to the one that's used in these transfer printers, but they transferred the type by impact. But they also had a supply reel and a system that drove the tape from the supply to a take-up reel, and then the take-up reel that took up the used tape.

And so I'm familiar with the problems of not advancing the tape sufficiently so that when you type you don't get a full print to advancing it too far to being wasteful for the ribbon. So I'm familiar with the electrical, mechanical aspects of the devices, and the operation of the devices.

MR. JAKES: Your Honor, we have Professor Kuc's CV. If I can hand that up to you?

THE COURT: I tend to be more influenced by whether what people say makes sense to me than what their background is, but I will take it.

MR. JAKES: I understand. Professor Kuc, could you give us a little bit of background on thermal transfer printers? We've heard a little bit already.

PROFESSOR KUC: Okay. So here we have a thermal printer set up in a packaging facility. We see the wrappers that are passing through. Here's the printer that prints the information on it. These things work 24/7. If the printer goes down, the packaging stops. So it's important to have high reliability, and

we have a bunch of different types of environments this can work in. So it has to be a good design to work in a variety of adverse environments.

Here we see the -- here's a close-up of a printer. This is the Videojet DataFlex Plus that is manufactured by Zipher, and so here we see the wrappers going past this printer. The ribbon is one use. There's a print head. Rather than a typewriter where you impact it, the print head has a series of small heating elements. As the element is heated up and put in contact with the ribbon, the ink comes off the ribbon and onto the substrate, which could be a packing material or a label.

So here is sort of a schematic of this device in operation. We see a label here that has nothing in it. It goes into the printer, and then we have maybe a bar code or some date or expiration date information on it. So again, it's a one-time use ribbon, and there's a thermal transfer of the print onto this device and that's what this device does is it prints these things, prints this information onto these labels.

MR. JAKES: Professor, could you tell us about the two different modes of operation.

PROFESSOR KUC: Sure. There are two main modes of operation of these devices in the industry.

The first is the intermittent printing, and so here we see the bags. They move up along this direction possibly and it stops. And during the time when the wrapper stops, the ribbon is in a fresh position printing. It's held stationary by the stepper motors and then the print head moves in contact with the ribbon with the heating elements causing the dots of printing to be put on the labels and then the head retracts. The substrate moves and the ribbon moves to put a fresh section of ribbon under the print head for the next print cycle.

MR. JAKES: This is a video.

PROFESSOR KUC: Oh, yes, so let's show the video here. And so we see this operation. Now, during this time since the substrate is moving, it's important for the substrate to hold the ribbon so it doesn't move as the head moves across the ribbon.

MR. JAKES: And the other mode of operation?

PROFESSOR KUC: The other mode is continuous operation where the substrate, the labels move continuously. And so what happens in that case -- so you have the label moving. The ribbon has to be accelerated to move along with the substrate. And then you have this print head, and the system calculates when the box or location of the printing label has to occur,

actually is under the printer. The printer head comes down then, just comes down and doesn't move, and the tape and the substrate move along with it and then it lifts up.

Now while the substrate keeps on moving, the ribbon now has to back up and then it gets in -- it sort of slows down first, and then because of the time it takes to slow up, some fresh ribbon has gone past it, the printer moves that ribbon backwards and puts it in a position where you have fresh ribbon under the print head of the next print cycle.

THE COURT: Why do people do intermittent printing if you can develop machinery that will work the continuous printing effectively? Is it any more efficient to do continuous printing?

PROFESSOR KUC: So with intermittent, you see it's on the order of two times per second where these go eight times per second. So you are right, your Honor, this is a more efficient way of doing it, but in some cases the packing process causes the thing to stop and so you might as well use that occasion to print on stationary substrate.

THE COURT: So the tape is in continuous printing, the tape is moving back and forth?

PROFESSOR KUC: Yeah, it's moving around all

over the place, because otherwise it would be wasted.

THE COURT: We'd have a lot of dead space where it isn't used?

PROFESSOR KUC: That's right. That's right. Correct.

THE COURT: Go ahead.

PROFESSOR KUC: This next slide gives you an indication of what's happening inside the tape drive. You have a supply reel that contains a fresh ribbon that's mounted in there. It goes past some rollers, past the print head, and then onto a take-up spool here, and a take-up spool is usually controlled by some sort of a motor. It could be a DC motor, it could be a stepper motor, but that provides the -- it provides the torque.

THE COURT: What are the advantages and disadvantages of a DC motor versus a stepper motor in this kind of machine?

PROFESSOR KUC: A DC motor fundamentally works differently than a stepper motor. A stepper motor gives you positioning, but it gives you sort of discreet steps in positioning. A DC motor is really a velocity device. You put a battery across a DC motor like in a fan and it turns. The idea here is when you have intermittent printing, you want to hold that printer -- the tape

steady and when you want to -- in continuous printing when you do the accelerations, the step motor does that as well with these high accelerations. So it's really a cost trade-off. These motors are not that expensive and it offers a good way of designing these systems.

So the tape drive has to do two different functions. The first is the tape transport and the other one is a tension control. So for the tape transport, the tape drive has to position -- the tape drive has to position the fresh ribbon under the print head for print operation.

Now, in order to do that, it's got to -- in some cases it's got to accelerate it up to the substrate speed. Then it has to hold it steady in some cases for the printing operation. It's got to decelerate it. It's got to move this ribbon all around so that you get the ribbon in the right place for printing.

THE COURT: Earlier devices that used slipping clutches, how did they work?

PROFESSOR KUC: I will explain that shortly. The tension control as was mentioned earlier is that you need to maintain the correct tension. If the tension is too big, it stretches or in some cases it breaks. That brings down the whole line, and then you have to go repair it. If it's too loose, the print quality

decreases. Sometimes the tape gets jammed in the mechanism and also brings the system down. So maintaining the tape tension is a major concern in this printer.

So you mentioned -- let's look at a drag clutch system. In that system you have basically one motor, either a DC or a stepper motor and that is driven. It drives the take-up reel to take up the used ribbon. In the meantime, the supply reel is attached to a device that provides a little friction to prevent it from free rolling and that's a clutch. It could be some sort of material like a brake or a felt that keeps the ribbon from free rolling.

Now, what happens is any time you have a material that sort of moves against each other, there's wear and there needs to be some sort of a periodic adjustment. You start out with a fresh one, just like fresh brakes, and after awhile they wear down. But what happens in the tension control, that -- see, this operation does tape transport and tension together in one operation and so the tension control is not as well controlled in here.

Further, because the clutch gives you only a particular type of resistance, think of a screwdriver, if you think of screwing a screw, the screwdriver -- if

you have a screwdriver with a big handle, it's easier to screw in than with the little screwdriver. It's tough. So what happens is that the same with the tension, varies when you have the same type of clutch with the same resistance. This is not a very good system. It served the purpose, but things could be done better, as we'll see.

MR. JAKES: Your Honor, may I approach? I have a SmartDate 3 printer that has a dry clutch system in it. I don't want to scratch up the bench, so I will leave it right there.

PROFESSOR KUC: So this is a -- if I can show this to you.

THE COURT: Yeah, go ahead.

PROFESSOR KUC: This is a SmartDate 3 version by Markem. And so here you see that there is a cassette that contains the tape. Here we have a take-up reel. Now, you will see inside the printer there is this little slot. That's where the motor is. And if you want to turn that a little bit, you can tell that's a stepper motor because that residual -- there's like little steps in there. We'll talk about that more shortly.

Now that motor engages this. This is the take-up reel. Now that reel goes past here. Now, in

these devices you want fast acceleration. Now, as I said before, this is the clutch here. There's no motor connected to it. It's a mechanical clutch. You're not going to get fast accelerations here. What they have done here is put this shuttle in here. You see when this shuttle moves, the print head is here. The tape moves very quickly and easy without actual movement of the motor. So this is how they got around the -- enabling the fast movement of the tape. You can see this tape is very thin and delicate. But the problem is you have a mechanical system, and mechanical systems are prone to failure and there tends to be maintenance problems. So this is a clutch system.

THE COURT: Okay.

PROFESSOR KUC: Now, let me answer a question that you asked before about why don't we use an optical sensor to determine the diameter. Let's take a look at a take-up reel. You see it's not really ideal. And so the question is what is the diameter here? It's compliant a little bit. It's got these up and down variations. So measuring it in a non-contact way are going to give you diameter values that are accurate.

THE COURT: Okay. Good.

MR. JAKES: You talked about the drag clutch system. I will come and get that from you.

PROFESSOR KUC: So a variation of the drag clutch system is the pull drag system. So the mechanical clutch has been replaced by a DC motor that's energized to go in the other direction to provide this respective force. So notice what you have here. You have motors that turn in the same direction, in this case counterclockwise, and this take-up motor is energized in that direction, but this drag system, the motor's actually energized in the opposite direction of motion. So here we have a similar system that has the advantage that you don't have a mechanical clutch to worry about, but it still has -- the disadvantages of the old single motor systems in that tape transport is not very efficient and tape acceleration is not what you get, and if you don't have the tape acceleration, the number of printings that you can make as you said in continuous operation is actually reduced.

MR. JAKES: Professor Kuc, could you tell us about stepper motors. Do you have an example of one up there?

PROFESSOR KUC: Yes, sir. I built a little demonstration to show you how a stepper motor works. There's a stepper motor, similar to the type that's used there. It's a little bit smaller. It has a hundred steps per revolution. The first thing you feel with

that is sort of that residual pulsation. And most DC motors typically have two wires. This one has six and you could have four, but there are many more wires into the stepper motor to control it.

Now, your Honor, here I've built a little system here. So first, inside is a stepper motor of the type I've shown you, and on the outside what I tried to do is model a take-up reel or supply reel.

First of all, why don't you twist that reel and you will see there's very little resistance to it. So now let's turn the power on. There is a switch there. So now it's been energized. Now you can feel the holding torque. That motor's driven to be stationary at that position.

Now, there's a button on there that gives you single steps. Every time you push the button down and release it, that motor steps one step. That's the idea of the stepper motor. It gives you only a set number of steps that you have to work with, but those steps are repeatable and you can stop it there. And so now I have a switch here that also gives you continuous operation, and so these lights indicate the energy, how the coils in the stepper motor are energized. So now if you continue that and now you switch the direction. Now just hold onto this tape here and you will see that with

each step you have a certain amount of ribbon that's put out, and you can rewind it. In other words, if you release the tension a little bit, it becomes a little bit of a problem that the tape sort of gets off the reel and things like that.

So stepper motor is very ideal to this application. So the graphic shows that the stepper motor is a digital version. Digital systems have discreet steps rather than continuous steps. And so --

THE COURT: What is it that causes it to move in discreet steps? Is it little bursts of power, is that how that works?

PROFESSOR KUC: So the way it works is you have a bunch of magnets inside the -- on the thing that rotates and you have other sets of magnetic poles that can be energized by applying the currents respectively, and so that's what those lights show is what combination of coils are connected and it jumps from one to -- to -- to another.

MR. JAKES: Okay.

PROFESSOR KUC: So the advantage of this is that when it's still, it's got a holding torque to keep the ribbon in place.

Now, I think that it's important that a stepper motor -- when you design with a stepper motor,

you think in terms of steps. But for the ribbon application you have to think in terms of lengths of ribbon for this thing to operate. You have to add a length of ribbon or subtract a length of ribbon.

So it's important to note that the stepper motor corresponds to a certain length of ribbon. That's the corresponding. Just like with the tape, there's a step. You are going to get a certain amount of ribbon.

THE COURT: But depending upon how big the diameter is.

PROFESSOR KUC: It depends upon the diameter, yes.

MR. JAKES: Professor Kuc, have you had a chance to examine or look at any of the Markem printers that are involved in this case.

PROFESSOR KUC: Yes, I've looked at the SmartDate 5, the SmartDate 5 Advanced, and the Series 18. I've seen their instruction manuals. I've seen the device specifications for the SmartDate 5 and the Series 18 and I've seen the code that does the firm ware for those three devices.

MR. JAKES: If you can look at the SmartDate 5, for instance.

PROFESSOR KUC: The SmartDate 5 -- we have one.

MR. JAKES: May I approach, your Honor?

THE COURT: Yes.

PROFESSOR KUC: Here's the SmartDate 5 printer, and then you remove the tape cassette. Now, it has two places where motors connect. So we have two two-stepper motors. So what it does is it has a -- it measures tension. It takes the tension error and it calculates a distance that needs to be added or subtracted to maintain the tension. From that distance they calculate the number of steps that a motor has to turn, either this one or this one. And then depending on whether tension has to be added or subtracted, they energize that motor. If tension has to be added, then they add those steps to the take-up reel to increase the tension. If tension has to be reduced, they add those steps to the supply reel to reduce the tension. Those added steps add or subtract.

THE COURT: Do each of those stepper motors step to the same amount, same degree?

PROFESSOR KUC: Yes. They use the same stepper motor for both. They do what's called micro-stepping and gets 3,600 steps per revolution. So those are the steps that they have to work with.

So as I mentioned before, there is a historicist. As long as the tension is within the

particular band --

THE COURT: You referenced measuring tension. What do you want to say about how it measures tension?

PROFESSOR KUC: So if I can go to the next slide.

THE COURT: Okay.

PROFESSOR KUC: Now, if you look at the Advance, so the Advance as mentioned before of the SmartDate 5 is exactly the same hardware, just a different firm ware. So what they do -- so they have these two stepper motors. Now they measure the tension error. How do they do that? They have this little rocker arm or it was actually some sort of -- this little device that moves. So if you have -- it's at some position, and as the tension increases, it pulls this arm. Now, there is a sensor in there that tells you about the arm position. Now that position is measured by the micro-controller through a device called an analog to digital converter. It basically takes a reading and it produces a value that corresponds to the actual tension.

One of the problems is that these analog to digital converters give you like the stepper motor finite values. The stepper motor gives you finite steps. The analog digital converter gives you finite

value. So, for example, let's say this tension position is 12.3. The analog to digital converter is going to give you a reading of 12. So it's going to give you digital values. So there's a little bit of approximation. Sometimes when they talk about estimating diameter, I don't know if there's even a good measure of what the data really is in terms of what it means for this. But the thing works, and so they take that tension error and here they calculate a number of steps which is equal to some tape length, some sort of tape length, and then they put the -- if the tension needs to be increased, they add those steps to the take-up reel when they need to increase the tension, and to reduce the tension, they add those steps.

THE COURT: They would do that in intermittent printing, but in continuous printing, isn't it a more complicated operation?

PROFESSOR KUC: The potential is the same in both.

THE COURT: The way the stepper motor's used would be different.

PROFESSOR KUC: It's the same stepper motor. The problem -- the thing is there is much more for these stepper motors to do in the transport part, but the tension part is basically the same. But you're right,

since with the intermittent printing --

THE COURT: They might just take it up to reduce tension, take it up fewer steps than they would otherwise take it up.

PROFESSOR KUC: Um-hum, because there are different requirements on the head. So those increased number of steps in these motors corresponds to adding or subtracting a length of ribbon to the ribbon between the reel.

MR. JAKES: And finally, I think we have the 18 Series or the S18.

PROFESSOR KUC: I don't have a series of 18 up here, but you saw where it had two stepping motors. It had a rocking arm, and the same sort of thing, when the arm would bend -- it's basically a spring. If you have a lot of tension, you draw the spring further. If it's a little spring, it doesn't draw the spring down as much, and you are looking at the position where the spring attaches and so that's where they get their tension measurement. They calculate the tension error. They calculate a length of tape to be added or subtracted from the distance from the tape between the reels. They then calculate the number of steps that a motor has to turn.

THE COURT: In doing that calculation though,

they don't try to take account of what the diameter is of the spool?

PROFESSOR KUC: In the 18 they do. In the SmartDate 5 Advance they don't. And the way -- the way -- I think what they are doing is just like their expert witness said, you've got a certain number of steps that, let's say, go four millimeters. They said you have 200 steps to do that.

When he talked about tension adjustment, he said you only have to adjust four steps. So the point is tension adjustment is a small thing. What they did, they just didn't take the error. They took the error and divided by four. Why did they divide by four? What that gave them is an average length of tape that would work, and that tape could work on either spool. So the spool diameters vary, according to Mr. Landers, to a factor of three. So let's say it goes from five millimeters to 15 millimeters, there would be a difference. If you set it at ten millimeters, you are only about five millimeters off. So the fractional amount is not that significant. The important thing is you are putting a length of tape that is related to the tension error.

MR. JAKES: Thank you, Professor Kuc. I think that's it.

THE COURT: Thank you. If you can stay around and probably there will be some questions for you.

All right. I need to give my reporter a break. How long do you anticipate argument will be on this?

MR. GLITZENSTEIN: From our perspective, your Honor, I think probably anywhere from 45 minutes to an hour depending on the questions you might have.

THE COURT: So we might be able to take --

MR. JAKES: 45 minutes.

THE COURT: So maybe we'll be able to finish up by lunchtime if we get back. All right. Well, let's take a short break and we'll come back and have argument.

(Recess taken.)

THE COURT: All right. We'll go ahead with argument. I'd like to work off one claim -- one term at a time; so why don't we start -- in this case we'll do drive and drivable. Let's hear what you have to say about it and then I will hear what the other side has to say on it.

MR. GLITZENSTEIN: Yes, your Honor.

THE COURT: Why does drive and drivable matter in this case?

MR. GLITZENSTEIN: Drive and drivable matter,

your Honor, for one reason in particular, and that is, that the final element of the claim which begins with the -- we've got the claim there on the easel -- which begins with the language "said controller," when you get down to the end, the claim says very specifically that the controller after it does this calculation has to control the motors to drive the spools. You add or subtract the calculated length of tape to or from the tape extending between said spools.

So what the claim requires, your Honor, is that the particular length correction that was calculated previously in that same element be added to or subtracted by virtue of controlling the motors to drive the spools.

THE COURT: There is no question in the products that were shown to me that -- your argument is what do you say drive means?

MR. GLITZENSTEIN: Drive means rotate, your Honor.

THE COURT: You're saying your product doesn't rotate?

MR. GLITZENSTEIN: In order to affect a given tension adjustment, when the system determines that there is an error and it runs through this algorithm that Dr. Landers explained and comes up with a number,

that number is then translated in different ways for different products. If that number is translated into a different number of steps -- I'm sorry, is translated into a number of steps and that number of correction steps is applied to only one of the two motors. So one of the two motors is rotated to try to get the tension back to where you want it to be. We don't dispute that, your Honor.

The issue comes down to the fact that the claim very clearly requires that both be rotated. Not only does the claim make that clear, your Honor, by use of the word plural. It says drive the motors, but, in fact, this was a key point during prosecution and they conceded that, yes, indeed, you've got to drive motors. You've got to rotate the motors, both motors, in order to accomplish this tension correction.

And that's why this is a central issue in the case, and it cuts across all three of the accused products in this case, which are the early version of the SmartDate 5, the current version of the SmartDate 5, and the 18 Series.

THE COURT: So you agree that one of the spools is rotated in all of your products for the purpose of adding or subtracting the calculated length of tape. You say that your product doesn't involve

rotation of both spools to achieve that end and, therefore, if your definition is adopted rather than their broader definition, you don't infringe.

MR. GLITZENSTEIN: That's correct, your Honor.

THE COURT: Isn't it true though that your product, particularly with respect to continuous printing, does rotate both spools to add or subtract the calculated length of tape? You've got -- both spools are being rotated a certain number of steps, and the net effect of that is both to make the necessary advancement of the tape to achieve efficient printing and to make the necessary tension adjustment.

MR. GLITZENSTEIN: In the continuous and the intermittent print cycles, there are -- the movement of the tape is sort of separated from the correction of the tension measurement as it was explained this morning. So in both continuous and intermittent, the way the software algorithm works is it first says I want to move the tape a certain distance. How many steps does it take for that to happen? Then there's a separate piece of the algorithm that calculates this number of steps, and in the intermittent mode it will add the correction number of steps to one of the two motors. If the tension is too high, it adds it to one motor. If the tension is too low, it adds it to the other motor. The

same thing holds true for the continuous. The only difference is --

THE COURT: In all cases, intermittent or continuous, both spools are, in effect, being rotated a certain number of steps to achieve the efficient printing and tension adjustment simultaneously. Your point is that the tension adjustment -- even though the two things occur simultaneously, the tension adjustment is only made to the one spool, not to the other.

MR. GLITZENSTEIN: They actually don't occur simultaneously with regard to the tension adjustment. I think that's maybe the best way --

THE COURT: I'm not understanding what I just had presented to me. I was under the impression that whenever the next movement of the tape, when there's a tension adjustment required, the next movement for printing purposes, that the tension adjustment just gets built into it and you just add and subtract a certain number of steps on both, at the same time advance the tape to where it needs to be to affect the printing, and make the tension adjustment. Are you saying that doesn't happen?

MR. GLITZENSTEIN: What I'm saying is the time period over which that occurs is not simultaneous in the following sense, your Honor. Let me sort of contrast

with what happens if there's no tension correction at all because I think that's probably an easier baseline for me to work from. In that situation, both motors start at the -- at the same time; both motors stop at the same time. If there is an adjustment to the steps in order to affect the tension change, one of the two motors continues to rotate after the second motor stops.

THE COURT: That's almost semantical, but I understand your point. If you were trying to measure the time, the amount of rotation, the number of steps required to advance the tape to a point where printing can occur without a tension problem would be identical on each motor; right? So assuming there were no tension problem required, you'd advance -- the tension was perfect, you'd advance 30 steps on each motor, right, to get to the next printing file?

MR. GLITZENSTEIN: It could be a different number of steps.

THE COURT: Or 50 steps or 100, but each one would be the same.

MR. GLITZENSTEIN: When you say each one, do you mean each step?

THE COURT: Each motor would be advanced the same number of steps.

MR. GLITZENSTEIN: No, your Honor. Sorry,

that's not right.

THE COURT: Even when the tension is right?

MR. GLITZENSTEIN: That's correct, your Honor. What I mean is --

THE COURT: I'm completely lost then.

MR. GLITZENSTEIN: Let me try to back up because I probably got you down the wrong path here. Let's again start from the situation --

THE COURT: No tension adjustment, you've got to move the tape to get a new spot to a clean print to print.

MR. GLITZENSTEIN: So the number of steps that you move is determined by the size of the reel, and it can vary quite a bit. So just by way of example, to pick up on Dr. Lander's point --

THE COURT: Now I'm with you. All right. So that may be -- because the diameter -- we talked about that -- the diameter is different, you may need a different number of steps without a tension problem. And your point is in a situation where there's no tension problem, there may be 70 on the supply and 30 on the take-up and so those would be affected. And then if there's a tension problem after that occurs or before you can arbitrarily assign it an X number of steps that are going to occur to adjust tension and those are

occurring only at one time on one of the motors and one of the spools and it's not occurring at the other. So although the operation is part of one continuous operation, there is some temporal difference between them. Is that your point?

But it's all part of one operation. Each time they do it, they calculate it and make that set of steps that's required both to adjust the tension and advance the tape appropriately.

MR. GLITZENSTEIN: And that's right. Your Honor, the way you just phrased it is exactly right. The claim breaks down the movement of the tape in order to get the fresh ribbon on there as really a separate component of the invention from --

THE COURT: I think that's almost semantical. I don't need to decide that now. You've convinced me that the term drive can matter depending upon whether I adopt your interpretation, because if I adopt Zipher's interpretation, it doesn't matter. The point you are making doesn't matter because under their interpretation you drive if you control the tape spools, and you control both spools when you are effecting a tension adjustment. You are controlling it by energizing it. Even if I accept your analysis of what's actually happening, you would have to concede that there is

control of both tape spools to affect the tension adjustment.

MR. GLITZENSTEIN: Your Honor, we don't dispute that broad concept there.

THE COURT: So you've convinced me of the basic point. I should pay attention to your disagreement about this matter. Now convince me that your interpretation is right.

MR. GLITZENSTEIN: With regard to drive, your Honor, on the claim construction issue of whether we're right or whether they're right, I think that's the issue. Is it narrow, meaning rotate? Is it broad being any type of control, even the type of control that holds steady? Because as Dr. Landers said, and we don't disagree, when we are adjusting that tension at the end, one motor continues to rotate, we do control the other one and hold it steady. That's the way the system works in both continuous and intermittent.

Your Honor, with regard to the term "drive" specifically, there are -- first off, I just want to put the term in context. The term actually appears quite a number of places throughout the claim. That's important for purposes of claim construction. It appears in three places in the claim and, frankly, the majority of the elements. That's important because the construction of

this term turns on really two very simple and very fundamental common sense rules of claim construction.

First one is that you can't say one thing about what the claim means during prosecution and then say a different thing litigating. The second thing, very important for purposes of drive and should really just simplify this issue considerably, is that the same claim term when it's found in different places throughout the claim should be given the same meaning. It's a very important principle. That's reflected -- your Honor, we've cited the Rexnord decision.

THE COURT: I do enough patent work and I know the principles.

MR. GLITZENSTEIN: Your Honor, I underscore that because of what we submit, your Honor, is sort of inconsistent treatment of the term "drive" by the defendants in this case. That's why I underscored consistency.

THE COURT: Just give me the inconsistency. What is the inconsistency?

MR. GLITZENSTEIN: The inconsistency is the following, your Honor. So just sort of summarizing the claim construction positions in this case, for purposes of the fourth element of the claim, the one with the "wherein" that starts it off, for purposes of that claim

term, wherein the controller energizes both said motors to drive the spools, there is no dispute here that that means rotates or turns. The parties agree that because of what happened, because of the way the claim is used, I guess, but really because of what happened during prosecution of this patent drive means turns.

THE COURT: Do you agree with respect to that portion of the claim that drive means rotate?

MR. JAKES: Yes, your Honor. We use the word "turn," but that clause that starts "wherein," yes.

THE COURT: Okay.

MR. GLITZENSTEIN: So, your Honor, point number one, I guess, from our side is that, therefore, applying the principle of Rexnord and many, many other Federal Circuit cases, it's got to be the same thing in the final element.

THE COURT: But no single principle or meaning is controlling in all contexts. In statutory construction, people like to have canons of construction. And for every canon of construction one could come up with, I could cite you a competing one that people often use. It's a good point, valid point, and important point, but it isn't necessarily dispositive.

MR. GLITZENSTEIN: It's certainly a very

strong presumption in favor of what we are trying to say, your Honor. And, in fact, the word "drive," it's not a coincidence that they are in both places in this claim. In fact, the same word "drive" was part of the prosecution of this case in order to get the claim allowed.

One thing before I get there, there is another point of agreement that I think is worth noting, your Honor, and that's with regard to the stepper motor. You've heard some discussions this morning about the stepper motor. We actually have agreed to construction on stepper motor that also requires rotation, and the agreed to construction is an electric motor that achieves step advance of a motor shaft. We are not disputing, your Honor, that a stepper motor can be held stationary. The point of this is that for purposes of this claim, the relevant way in which a motor can be controlled is, again, by agreement of the parties to rotate, to advance a certain number of steps.

So let me take you to what we consider to be the important piece of the file history. I'm having a little trouble reading this on my monitor, your Honor. I don't know if this is at all legible for you.

THE COURT: I can read it.

MR. GLITZENSTEIN: Your Honor, actually and

while I'm on that subject, I do have 70 pages of Powerpoint here. I did bring extra copies if the Court is interested.

THE COURT: Do you think it would help me? You want to hand it up?

MR. GLITZENSTEIN: I would. Thank you, your Honor.

Your Honor, I'm on Slide 9. The relevant section of the prosecution history with regard to the term "bribe" concerned a rejection from the Patent Office over a prior reference called Barrus. And in Barrus, Barrus also used stepper motors. And in Barrus one of the stepper motors would be energized to rotate the take-up spool and the stepper motor for the supply spool would also be controlled, but it would be controlled in a special way. It would be controlled to provide a selective amount of resistive torque or drag.

So the specifics of Barrus are that they would have the output of the stepper motor coupled up to some resistors. The controller would actually control the resistors so that when the take-up spool pulled on the supply spool, the supply spool would provide a selective amount of resistance depending on what the controller told it to do. This was one way that Barrus figured out how to accommodate changes in the diameter of the

spools.

But the key point with regard to Barrus is that both motors were controlled, but only one motor was actually driven to rotate and take up the tape from the supply spool to the take-up spool. And that was really the basis on which they distinguished Barrus successfully and got the claim allowed.

THE COURT: Yeah.

MR. GLITZENSTEIN: This discussion highlighted, it's fairly lengthy, but we highlighted, if you could --

THE COURT: I've got the point. I will wait to hear their response, but I fully understand your point.

MR. GLITZENSTEIN: So they actually distinguish Barrus, your Honor, on two bases, and I want to underscore that it's both the way in which Barrus drove the motor in order to move the fresh tape under the print head. That's the second to the last sentence of the passage that we quoted here, but the last sentence also distinguishes Barrus on the way in which tension is maintained in Barrus. They say that Barrus teaches that only one of the motors is energized to drive a spool of tape in the direction of tape transport, the other being controlled to provide drag.

So they say one is powered to rotate, the other one is still control.

Now, the claim -- and I'm going to just jump ahead here to Slide 12 just to put this in context. The claim, your Honor, at this point in time contained the language that I showed on this slide but without what I've underlined in red. That language that I've underlined in red was actually something that the examiner asked Zipher to insert into the claim. So what happened was they made all these arguments, and initially the language at the time was just that the controller controlled said motors to add or subtract the calculated length of tape. The examiner said, essentially, I'm not going to allow that claim as it stands. I heard your arguments over Barrus. It was the subject of a lot of discussion, including an interview down at the Patent Office. I've heard your discussion over Barrus. You've got to add the words -- after the words "control the motors," you've got to add the words "to drive the spools."

So clearly, the examiner is saying it's not just a matter of control, it's a matter of control to drive. Zipher had just told the examiner, and there's no dispute, that with regard to the previous element of the claim that drive means turn, rotate, and the

examiner came back and said I want to see that word "drive" in the final element of the claim as well. And the examiner consulted with Zipher's lawyers. Zipher's lawyers agreed.

I'll just back up to the previous slide. We put this on our papers and I won't belabor the point, but he said you've got to have this in the claim, and they accepted it. That's acquiescence and they're stuck with it now. And, in fact, the examiner here stated why do you allow the claim? He said he allowed the claim because of the requirement that the controller controls the motors to drive spools to add or subtract the calculated length of tape. That's part of what he thought was important.

Your Honor, where there's no dispute that drive was added to the fourth element -- that drive in the fourth element of the claim means turn, and where the word "drive" here at the state part of the prosecution history we submit has got to be the same.

THE COURT: I've got it. Okay. What's your response on that?

MR. JAKES: First of all, your Honor, we don't say "drive" means turn. We say drive has a broader meaning. It means accelerate, decelerate, hold steady. It can mean any of those things. In the particular

clause wherein the controller energizes both said motors to drive the spools in a --

THE COURT: Is there a difference between turn and rotate?

MR. JAKES: No, I don't think so.

THE COURT: So you say "drive" means rotate in the clause above, but you say "drive" means control in the clause below.

MR. JAKES: No, we don't. We say drive has the same meaning throughout.

THE COURT: So it means rotate?

MR. JAKES: Drive in a tape transport direction means something in addition to drive, and if I could just give you an example. Driving a car. It's a common phrase. You drive a car. That means you start it, you stop it, you accelerate it, you brake. You say you drive to Boston. We understand what that means.

THE COURT: I used this with my clerk. I said suppose we are at a stop light on a hill and we are trying to keep the car from rolling backwards, right, engine not driving the car. You're trying to keep it from going backwards. I used that very same thing.

MR. JAKES: You used that understanding of the term. If I said drive a car in reverse, are we using a different meaning for drive? No. But when I say drive

the car in reverse, it doesn't mean braking.

THE COURT: Certainly drive can mean control in the sense that I drive a vehicle. I'm not powering the vehicle. I'm not pushing it up the hill. I'm controlling it. But that isn't the term, the meaning you've given to the term above in the same claim, and it is arguably not the meaning that was used to distinguish the prior art.

MR. JAKES: We've given the term "drive" the same meaning throughout, but when you put it in context and say drive in a tape transport direction, that doesn't mean holding steady. Drive itself can mean holding steady, but when you say drive in a tape transport direction, that implies movement and in a particular direction, and that's why we say that particular clause can mean turn or rotate both spools.

THE COURT: Because that requires tape transport, that there actually be tape transport, and that can only occur through rotation. You say in that context "drive" means rotate, but down below where drive doesn't explicitly require rotation, you think that it can mean something else. And so your view was control, and in the upper one it's control by moving in the direction, by rotating, and down below it can include other forms of control like leaving stable. How do you

distinguish the prior art, which apparently -- or your explanation, how do you distinguish the prior art at the time you were obtaining the patent and the examiner's requirement that you include this language specifically to address a problem with a prior patent in which only one spool was moved?

MR. JAKES: Well, if we could just look at what Markem's counsel put on the screen.

THE COURT: Which one do you want?

MR. JAKES: Well, we're looking at currently it's Slide 11. The part that's highlighted at the bottom really does just address the claim language, controls the motor to drive the spools to add or subtract the calculated length of tape. There's nothing there other than repeating the claim language. But if we can turn back to Slide 9 where the highlighted language is.

But where Barrus was distinguished, what you really have to look at there is the words "tape in the direction of tape transport." Barrus is being distinguished in that it only teaches one of the motors to energize -- to drive a spool of tape in the direction of tape transport.

THE COURT: What does "drag" mean in that context?

MR. JAKES: Drag? It's like the drag clutch system or a pull drag system, which was the other one we used in the motor.

THE COURT: So it encompassed both do you think?

MR. JAKES: I think Barrus was a pull drag system, but there was count contrary, either force or respective force --

THE COURT: Pull drag means the DC motor is going in the actual opposite direction?

MR. JAKES: It's being driven in the opposite direction. It actually rotates in the same direction or the tape wouldn't move.

So this is addressing the tape transport aspect. It doesn't have anything to do with the tension control, and that's why the word is in there and the direction of tape transport --

THE COURT: Isn't he saying that in order to overcome Barrus, you need to actually have driving of spools, plural, in order to overcome Barrus and you need that rotation of spools, plural, not control of spools, plural?

MR. JAKES: For tape transport, yes, not for tension control. That's the wherein clause. Wherein the controller energizes both said motors to drive the

spool in a tape transport direction. and that's what this is exactly saying. It talks about in a tape transport direction. Remember Professor Kuc said there are two functions? There's the tape transport and then there's the tension adjustment, and we are talking about tape transport here, and certainly energizing and driving both motors in a tape transport direction doesn't distinguish the prior art. But that's different than the tension control.

THE COURT: Yeah, I'm having some trouble with that.

MR. JAKES: Well, if I could, your Honor, if I could put on the document camera here the interview summary. Markem's counsel made the point that the words "drive the spool" were added by the examiner and that was somehow to distinguish the prior art. If you look at the interview summary, and this is Exhibit 4 and the page is 11630.

THE COURT: If you can maybe just enlarge it just a little. That's good.

MR. JAKES: If you look to the second to last sentence in the beginning paragraph it says, the examiner requested and Mr. Nelson agreed to make minor changes to Claim 68 to improve the style of the claim.

That's the amendment to drive the spools that

we are talking about.

THE COURT: This is Mr. Nelson's memo of what was said to him?

MR. JAKES: That's correct. This is the attorney's summary of the interview and the summary record.

THE COURT: Wouldn't you expect the attorney to summarize things in a way that is most beneficial to his client?

MR. JAKES: Well, to the extent they are incorrect, the examiner has the chance to comment on it. But here I can show you, here's the examiner's interview summary and it says, discussion regarding the status of Claim 68 and additional languages have been discussed to more clearly define the scope of Claim 68.

It doesn't say anything to drive the spools is necessary to overcome the prior art because the prior art is distinguished by that wherein clause. Wherein the motors drive the spools and a tape transport.

THE COURT: When a drag device is used, isn't it a tension controlled device?

MR. JAKES: It is, but it's different than what's in the invention. The invention eliminates the drag device whether it's a drag pull motor, whether it's a drag clutch.

THE COURT: But that last sentence is that the purpose of the drag control device is to control tension, and the examiner's concern was that the prior art had a device in which spools were controlled to control tension. One spool was driven in a tape transport direction, the other spool was controlled by drag, and he said you can't have a device that only has one spool that is driven in a tape transport direction. You have to have driving of both spools in a tape transport.

MR. JAKES: And we do have that for tape transport. That's in the claim.

THE COURT: That's that last clause that you are adding. I don't understand the significance. It's getting by me.

MR. JAKES: Well, there is something significant about using both motors and both spools turning in the same direction for tape transport. It eliminates the drag. You will have faster acceleration, faster deceleration, more precise positioning, and that's the distinguishing of the prior art. Now you get rid of a drag clutch because both motors are turning in the same direction. You have to do tension control, but that's done differently, and that's not the basis on which the prior art was distinguished. It was

distinguished on tape transport, both motors engaged in tape transport to drive the spools.

THE COURT: All right. Anything else you want to say on this drive and drivable?

MR. JAKES: Well, the terms are not synonymous. I think if you look at the specification, there are certainly different ways that the term "drive" is used. It can be used to mean decelerate.

Markem says there is nothing in the specification that talks about holding steady.

THE COURT: Well, an argument that Markem didn't make, at least one that I thought it could have made, is if your definition is right, you use the term control in the claim, and if you wanted drive to mean control, you would have said control, especially where you use drive in a way early in the patent than you mean rotate, and I have a lot of trouble with that.

MR. JAKES: Control is the next best synonym. What we really wanted to use was the term "drive" because drive does have a broad meaning. Your Honor, I do disagree that drive means rotate. Drive in a tape transport direction means rotate in the context of this claim, but if you just take the word "drive" out, drive still has a broader meaning that can mean holding steady and stopping and starting.

THE COURT: It can have a broader meaning, but we want ordinarily to require our drafters to use terms in a consistent way, and I assume you would at least concede this was not perfect drafting of what you're saying is true because you don't teach drafting to use a term in the same claim in different ways. That's just not the way any drafter of a claim would set out to do it. You might inadvertently accomplish that end, but you don't -- that's not sound drafting. You don't draft it that way. If you mean control you say control, especially where in context you've got a different meaning to the term "drive" earlier in the claim.

MR. JAKES: I still disagree we have a different meaning for the term drive. It's like in my example. Driving to Boston and driving in reverse, the word "drive" hasn't changed meaning, but certainly the contention of those phrases implies something different. So drive in a tape transport direction doesn't require movement and rotation. Driving the spools for tension control does not, and we chose the word "drive", and the fact that we are having this discussion, perhaps we should have chosen a different term, but drive captures how these spools are operated, how they are controlled, how they are driven. And control --

THE COURT: Why don't you show me the other

language in the specification that you think allows for drive to encompass a broader meaning than Markem suggested?

MR. JAKES: Okay. We need 4B up and if you could get Slide 38. Slide 38 has a couple of examples where "drive" is used to mean something certainly broader than rotate. And the first example from Column 20, the supply motor is driven to cause deceleration. In the second example from Column 23, we are talking about driving the ribbon. Certainly that doesn't mean rotate, rotating a ribbon. But it says you can advance it at a constant speed, stop it. Intermittent printing is an example of driving the spool where there actually isn't any motion required.

If you look at the term "rotate" in Column 4, it's actually used in the sense of rotate meaning turn or actually applying movement. So drive and rotate are certainly not used synonymously in the claim.

Two very good examples though, in discussing the prior art at Column 2, the '552 patent -- the '572 patent, our patent says the two spools are driven. Then if you go on to read what it means by the two spools being driven, the take-up spool is driven by the motor, the supply spool motor is fed at a low level drag current to maintain ribbon intention, meaning that the

driving -- the spool is actually in the opposite direction and it will rotate in the same direction to move. But when the two spools are driven -- and one example there is a drag current to maintain an intention. It's not to rotate. The second example also discussing the prior art '558 patent, the word "driving" is used, one driving the take-up spool and one driving the supply spool. That refers to the DC motors in that particular patent, and in one case that supply spool DC motor acts as a brake and yet it's being used with the word "drive".

THE COURT: Does it act as a brake by moving in the opposite direction?

MR. JAKES: No, it doesn't actually move in the opposite direction. It just slows down the movement during the tape transport. But it's being driven in the opposite direction. The force, the electrical force from the motor is in the opposite direction so it's actually being driven in the opposite direction. It will rotate or turn in the direction of tape transport, but when it says "driving," meaning using the brake.

THE COURT: I see your point.

MR. JAKES: So driving is not used to mean rotate in any sense of the word. In addition, we did discuss the intermittent mode. In an intermittent mode

certainly spools have to stop. They have to be held steady.

One thing Markem did say, I believe, that holding steady is not disclosed anywhere in the specification. I don't think that's right. First of all, the operation of the stepper motor as your Honor saw, it does require electrical power to hold it steady in the first place. It spins freely when it's turned off, and that's something a person skilled in the art would know. It doesn't have to be stated in the specification.

Second, inherent in the intermittent printing, the spools have to be held steady at some point. Holding steady is also disclosed in the specification. And finally, the specification does describe the tension control adjustment using one or both motors, and in that case one motor must be held steady. There is really no other way to do it. So whether or not the words "hold steady" are actually appearing in the specification, the concept of holding steady through a stepper motor certainly does. So the term "drive" certainly doesn't mean rotate. It does mean something broader than that. We could have used the word "control," but control fit with the motors. That's really what was happening there. Spools are being driven and that can mean stop,

start.

THE COURT: Yeah, but you are talking about driving up above. You're talking about using the term "drive" which you say means control in a sense that in context you concede that the entire phrase means to rotate.

MR. JAKES: Yes.

THE COURT: And when you do that and you have available to you and, in fact, use in the claim another term that precisely captures what you now say you meant, one would expect you to use that term, control, and you didn't.

MR. JAKES: Control is actually not as precise as drive. It's the best synonym we have.

THE COURT: I'm sure you're saying that now, but if, in fact, what you're telling me, drive is like I'm driving my car and that means I'm controlling it, it isn't -- if you are trying to explain to someone who doesn't know what cars are but knows about engines and knows about control, and you said drive the car, you would tell the person, no, the engine is driving the car. The operator is controlling the car. That would be the precise way to describe it.

An imprecise way would be to say I'm driving in the car. If you are trying to describe what the

respective responsibilities of the motor and the operator are, you wouldn't think of the operator as driving the car unless it was Fred Flintstone with his feet pushing the car as he goes up the hill, and that's the problem I have with what you are saying.

What you really meant was control you now tell me. Control is, in fact, more precise. Control does capture what you say you meant, but you use control in the claim itself and use drive in a context in which it meant rotate. So now you want me to take "drive" in a claim where you used it in the context that collectively using your approach meant rotate and want me to say that it means something where you use the term "control," the more precise term elsewhere.

That's the problem I'm having with your analysis. I concede that there are references in the specifications that I'm going to have to look at carefully because there's not absolute precision with how the term "drive" is used there. So I take your point on that. But, in general, I've got a problem with you on drive.

MR. JAKES: Actually, your Honor, I may have misspoke. I think drive is actually more precise than control.

THE COURT: I know you say that. I think the

opposite. I think control is more precise than drive, given the meanings that you are suggesting drive has.

MR. JAKES: And the natural context of driving a car is something everyone understands and the context of this patent driving the spools is the same thing.

THE COURT: Not where you have a controller who would be the driver of the car. The controller is what you are talking about as a separate thing from the -- what drives. You have a controller and you have a driver and it's the motor which drives the tape spools. And there's something else, a controller which controls the operation of the motor.

So they are different things in this and you're saying it's really the same. It's like the controller is the same in both cases. I just think that the terms are not -- I think the problem I'm having with your analysis is, first, I don't understand your attempt to distinguish counsel's argument about prior art, and my own reading of the totality of the claim suggests to me that drive means rotate. I didn't understand why that was significant until he explained it to me just now. But that was my initial impression having read the materials, and I'm still inclined to that impression. I will study it very carefully and think it through, but my inclination is to say that drive means rotate. But

anything else you want to say on that particular subject and then we'll go on to the next one?

MR. JAKES: I would just reemphasize, if you look carefully at the prosecution history, that the prior art is being distinguished on the tape transport and driving both spools or turning them for tape transport, not for tension adjustment. Those two things are handled separately.

THE COURT: I will take a very hard look at that because it's not something that I had looked closely at up till now.

MR. JAKES: And if you look at the specification, it does say, and this is a critical point, that the tension adjustment can be accomplished by one or both motors adding step adjustments, and for there to be one motor, the other one has to be held steady, and that is certainly an embodiment that is described in the patent, and you would have to find that we didn't claim that embodiment; that we only claimed a specific preferred embodiment where both spools rotate at the same time in order to do the tension adjustment. That's certainly not required by the specification and it's not required to distinguish the prior art.

THE COURT: So you're saying the specification discloses embodiments in which tape is added by stepping

one motor and leaving the other energized but not stepped?

MR. JAKES: That's right. On our Slide 46 it says the step adjustment can be made to either or both of the motors to add a short section of ribbon.

THE COURT: You say that's contrary to what's claimed; right?

MR. GLITZENSTEIN: Two points, your Honor, on that. Yes, first and foremost. The claim is not directed to the either/or piece of that package that they have just quoted. It's directed to the both part of that package. The claim requires plural. If not in the first instance, directed to either or both. The second point, your Honor --

THE COURT: Normally, people are saying don't limit the claim to the embodiments. Now you're saying disregard the embodiments when construing the claims. Construe the claim more narrowly than what's disclosed in the embodiments.

MR. GLITZENSTEIN: Not at all, your Honor.

THE COURT: I'm not understanding.

MR. GLITZENSTEIN: This is a very selective quotation here. That column obviously does include those words either/or both of the motors.

THE COURT: Where are we?

MR. GLITZENSTEIN: Column 22 if my memory is correct.

MR. JAKES: Column 22 beginning at Line 17.

THE COURT: All right. Why do you think the quotation is selective and not important to the analysis?

MR. GLITZENSTEIN: It is selective and not important to the analysis, because if you continue down to the bottom of that same column, it talks about both motors as being an advantageous approach to implementing the tension correction. I'm looking specifically at line 66 where it talks about the motor feed system splits the correction evenly between both motors in order to avoid large gaps between prints or over-printing of the ribbon.

You heard earlier today, your Honor, about how avoiding gaps is actually an important consideration when you're running one of these printers or designing one of these printers. And, in fact, when you split the correction between the two motors -- and I've got a little graphic that I can use to demonstrate this point, but if you split the correction and you rotate both motors in order to increase the tension in the tape, you wind up maintaining the position of the ribbon better than if you were to rotate only a single one of the

motors. So actually, the patent clearly identifies using both motors just as the claim says, using both motors and rotating both as an advantage over just doing a single motor.

THE COURT: So you're saying you could do it by either/or, but we are doing it by both and that's an advantage over the prior art? That's how you're saying that should be interpreted?

MR. GLITZENSTEIN: They are saying it's an advantage over doing it by one. Yes, we are. They are clearly saying that splitting it is advantageous. There are other passages that talk about how precisely you want to position that fresh tape right by that print head. They say there is an advantage to splitting it both. So very simply they did what many, many patent owners do, they claimed their preferred embodiment.

THE COURT: The last response by you on this and then I've got to move on. Is there anything else you want to say?

MR. JAKES: Yeah, we are talking about the preferred embodiment, an exemplary embodiment, not the invention. The invention is broader than that. That's why it says one or both.

THE COURT: I will look at that carefully before I make up my mind on it. Let's talk about the

next term, calculates and calculated. Let's take those together.

MR. GLITZENSTEIN: Your Honor, may I be heard for literally 30 seconds on one technical point that was made that concerns the specification and it also is this same quote?

THE COURT: Go on.

MR. GLITZENSTEIN: Counsel said that the only way to achieve tension adjustment using a single motor is by holding the other one steady. I just want to underscore that is not in the record. I could think of ways to do it. You could physically lock down that first motor with a clamp. You could also just spread the total number of correction pulses so that both motors start and end at the same point. It was the point we were talking about earlier. Instead of having it continue on past the end, you just have it start and stop at the same point. There's no evidence for that. That seemed to be an impact on the consideration of the issue. I just wanted to emphasize it.

THE COURT: All right. Let's talk about calculate and calculated. You say performs a mathematical operation to determine and mathematically determine. What do you mean by mathematical operation?

MR. GLITZENSTEIN: Ordinary meaning for that,

your Honor. Any mathematical operation, addition, subtraction, square root, whatever there is, we think that's a term that a jury is well aware of. The concern that we have with their construction is simply we submit that it actually takes a term that is reasonably clear to a lay juror and that is one of the goals here clarifying. Takes it and actually makes it harder to understand. Our objection really is, is this derived by processing? We certainly agree that derives can be calculations.

THE COURT: You have a lot of people use the phrase "mathematical calculation." You would say that's redundant; right? You're saying if you do a mathematical calculation, all calculations are mathematical so you shouldn't say mathematical calculation. What about algorithms aren't necessarily mathematical; right? You can have an algorithm that is a set of instructions that uses logic -- that's why I asked you what mathematical meant. I don't think of an algorithm as necessarily being mathematical. It can be a set of instructions that you deduct in logic that don't involve arithmetic calculation.

MR. GLITZENSTEIN: Your Honor, with regard to the context in which this term is found in the claim, we submit that it actually is mathematically oriented

because it talks about calculating a length of tape in order to maintain tension in the tape between predetermined limit values. Given its fair reading, this is a numerically oriented passage of the claim. Certainly, the specification, I'm not suggesting you are limited to it. The specification is loaded with math.

THE COURT: Why does it matter to this case?

MR. GLITZENSTEIN: I was just going to put my chips on the table on that one. This is really a clarity issue for us. We just think that derives by processing is just harder to understand and we don't exactly know what the metes and bounds are.

THE COURT: Well, the problem I have with that definition is that it means derives. Because I don't know if derives by processing, derives by any means other than irrational means or something. It's hard for me to get a grip on what they really mean there. They just say derives by processing and they give several examples, but I don't see where you can get from the language of the claim or the specification a meaning that limits it to a mathematical determination. Say, for example, they used a look-up table. You would say that is not a calculation?

MR. GLITZENSTEIN: We would say that look-up tables are not calculations.

THE COURT: How do you get to the numbers that are in the look-up tables?

MR. GLITZENSTEIN: Well, the numbers that are in the look-up tables --

THE COURT: Made up by calculation. They are just done by calculation that occurs previously. Somebody calculates it and it goes into a look-up table.

MR. GLITZENSTEIN: The use of information out of a look-up table though, that's really what this is directed to. Can a look-up table be a calculation of a length? The act of consulting a look-up table to get a length of tape, is that the calculation?

THE COURT: If the values in the look-up table are derived from the calculation, then yes. Because you are doing it in steps. You've done the calculations to prepare the look-up table, then you have the look-up table, then you consult it and determine the length of tape to be added. Therefore, the process by which you get to the result involves mathematical calculation.

MR. GLITZENSTEIN: There's a mathematical calculation to get some set of data to be consulted. In your hypothetical, that's certainly true.

THE COURT: Do you use a look-up table? Is that why this is in your product?

MR. GLITZENSTEIN: We actually don't use a

look-up table, your Honor, and so I did want to say that this is really more a clarification issue.

THE COURT: How do you do it other than by a mathematical determination?

MR. GLITZENSTEIN: We use a formula, your Honor.

THE COURT: So you do it with mathematical determination.

MR. GLITZENSTEIN: We do.

THE COURT: So why should I care?

MR. GLITZENSTEIN: The important thing here is it does affect the scope of the claim for purposes of prior art, and it also affects essentially what this invention is about.

THE COURT: I haven't looked at the underlying dispute here, but you're basically -- your principal argument is a noninfringement argument, I assume?

MR. GLITZENSTEIN: Yes, it is, your Honor.

THE COURT: So that's how you are going to win is by demonstrating noninfringement. I'd rather focus on the argument that you think entitle you to a judgment of noninfringement because I've got enough to do here, and determining things in the abstract that I don't need to determine is not something I really want to spend a lot of time doing.

MR. GLITZENSTEIN: Your Honor, this is certainly not an issue that we see as a dispositive one in this case. It's in here because it's purely a clarification issue. We just want to know what it means. We think we are right with regard to the scope, but at this stage of the case for purposes of disposing the case on noninfringement grounds, it's not something that we rely on.

THE COURT: I appreciate it. Did you want to say anything on the calculates and calculated issue?

MR. JAKES: Your Honor, the only thing I would say is that by limiting it to a mathematical operation, all you're doing is really shifting the focus from one word to another. We'd be back arguing over whether or not something is a mathematical operation.

THE COURT: Can you give me an example of the way in which a calculation would be done here without a mathematical calculation?

MR. JAKES: A look-up table.

THE COURT: To me -- suppose you did it by measurement, observation. I don't think of that as calculation in the same sense, but I do think calculation, although the sentence that comes immediately to mind is a mathematical operation.

MR. JAKES: That would be one example.

THE COURT: But there are certainly other types of calculation that people engage in that doesn't explicitly involve a mathematical -- when you sit down and figure out how to persuade me of something, you are engaging in a form of calculation that isn't explicitly mathematical, but the problem is then what does it mean? It means any -- you give it a very broad meaning which is any derivation by process.

MR. JAKES: That's right. We do have a controller that is doing the process thing, and as your Honor suggested, an algorithm may or may not have something that someone would call a mathematical operation, but it could be a series of program steps where you --

THE COURT: First do A, then do B, take value C, then do D, but not do anything mathematical.

MR. JAKES: You may not find the divide instruction or the multiplying instruction. What it's doing effectively is a derivation of the value that it needs through these steps. That would be within the ordinary meaning of calculate as well. So limiting to mathematical processing, as I said, it just shifts the debate as to whether or not something is a mathematical operation and unnecessarily narrows it. Derive by processing, that's what we came up with. It's not

really a critical term, but limiting it in this way to exclude things like look-up tables or other implementation details doesn't seem necessary.

THE COURT: I will hold judgment on what I'm going to do with respect to that. Tension, is there really a meaningful difference between the two of you on this concept of tension? I think of tension as a reactive force induced by stretching, but I think both of you say the same thing.

MR. GLITZENSTEIN: I don't see this as a dispute of substance at all, your Honor. I think there are two ways to look at tension. The dictionaries seem to have both. One is a number. The other is sort of the physics characteristic, which is maybe the one that your Honor was suggesting.

THE COURT: Well, you can measure that reactive force. You have a weight on a string and you want to see how much tension is put on the string by the weight. I assume you could hang a spring scale to it or something. Wouldn't that give you a measure of the reactive force? I certainly haven't done physics in a long time. But you would get a numerical value for tension, depending upon how you measure that reactive force. But that's the force that comes from stretching.

MR. GLITZENSTEIN: There is a force that sort

of exists because I guess you've got molecules or something holding each other together, pulling each other apart, whichever it is. And then you've got a number to try to capture what that is. The dictionaries do -- I think they are pretty evenhanded in all candor about the treatment of adding. We're just, again, sort of echoing the point I made with regard to calculate. The issue of tension appears in this final element, and in a mathematical -- not mathematical, poor choice of words -- in a numerical sort of context, the goal is to maintain the tension between some values. So in looking at the dictionary definition, we gravitated more to the one that was a value rather than property.

THE COURT: Did you want to say anything about tension?

MR. JAKES: Your Honor, just a couple of things. First of all, I don't think there's a meaningful dispute as far as noninfringement. The real thing is that we say tension is a condition and they say it's a measure, and the claim language itself if you look at it doesn't talk about measurement. It talks about maintaining tension. So, for example, the dry clutch system maintains tension in the tape without measuring it.

THE COURT: But it's at predetermined limits.

MR. JAKES: Our claim doesn't go beyond that, but I think if you look at the other terms that Markem wants to construe, they tend to take measurement of tension and then add that to the last clause along with other things; such as, when the tension has to be measured, how it has to be measured, does it have to be measured during tape transport? So I think that's really just a prelude to one of their other arguments to say tension requires a measurement. It just requires maintaining it, and I think it's just part of their effort to limit our client's preferred embodiment.

THE COURT: Let's go to the next one which I think is important to your analysis, predetermined limit value, and your position at least at first blush seems sensible to me. So maybe I ought to have Zipher's response to it and then your response to Zipher's.

The problem I'm having with your interpretation is the word "between" in your claim. How do you deal with that.

MR. JAKES: Your Honor, we'll agree with an upper and lower limit. It just seems like it's implied with that. If you remember in the prosecution history, we actually took out upper and lower limits. There's an implication that they really shouldn't be there, but when you look at the word "between," I'm not sure you

can really get around that. So I don't think that there really is any difference once you put in upper and lower. The parties agree it means an acceptable level of tension.

THE COURT: You've got a problem with one of their products. We don't have to get into it today, but they are saying they don't have to determine upper and lower limits in their product, one of their products.

MR. JAKES: I think actually for the same reason that the claim has upper and lower limits, their product will as well. There's always going to be some point where they don't adjust.

THE COURT: That's more as a summary judgment issue.

MR. JAKES: In that region they will be between the upper and lower limits.

THE COURT: Now, in the next several claims because we don't have a lot of time here, the one that struck me after what I heard today -- and I wish I heard all this stuff before because it could have helped me in preparing for the hearing. But if you go to the table that you gave me, the chart, if you go to the -- page four, the second one down, said controller calculates a length of tape to be added to or subtracted from tape extending between said spool in order to maintain

tension in said tape between predetermined limits.

Markem reads into that language a requirement that the tape tension is measured without contacting the tape. Based on what I saw today, that probably is an important argument for you, I would assume, because your product you say does mention tension by contacting the tape.

MR. GLITZENSTEIN: That's correct, your Honor.

THE COURT: Where do you get this requirement that without contacting the tape, where does that come from?

MR. GLITZENSTEIN: Principally, your Honor, it comes out of the specification and it comes out of Column 4 of the specification beginning at Line 27 and this is a paragraph that is talking about what they refer to as exemplary -- I'm sorry, your Honor.

THE COURT: Four, 20?

MR. GLITZENSTEIN: Four, Line 27. So in this paragraph, your Honor, they call it a brief description section, but this is essentially what a lot of patents call a summary of the invention. This is a patent that does discuss what's referred to, and we acknowledge it, an exemplary embodiment. We submit that this is actually the embodiment to which they're really directing the claims of this patent, and it talks about

-- earlier in the patent it talks about the importance of measuring and monitoring tape, and it continues at Line 32 and says, tension in the tape being transported is determined by control of the drive motors. Tension is determined by control of the drive motors and, therefore, is not dependent upon any components which have to contact the tape between the take-up and supply spools.

THE COURT: That doesn't exclude the possibility of a tension measuring. You can't escape from an infringement by adding some additional element that's not in the claim; right? I mean, if you infringe all of the elements of their claim and then you add another element to it, it doesn't make you noninfringing. You're infringing. You have a device for measuring tape tension. They don't need to have a device for measuring tape tension by touching the tape, but that doesn't mean your product doesn't infringe and that doesn't -- I shouldn't read there, because they say it isn't necessary, doesn't mean it's an element that it need not be present. That's the problem I'm having with your argument.

MR. GLITZENSTEIN: The question comes down to whether this is an inherent aspect of this invention, and that's really the issue and the law on this.

There's not a lot of law on this point, your Honor. It's the Honeywell case and the Microsoft case we cited in our papers. There's case law where the specification places sort of an inherent level of significance on a particular feature. It does become part of the claim, and in the Honeywell case, just by way of example, the claim term there was look ahead distance, and the question was whether that inherently required some assessment of time. And the appellate court there looked very closely at the specification and said based on the importance that time plays as part in discussing that feature of the invention throughout the specification in view of the treatment of the issue in the specification, we are therefore going to construe the term to require a time feature that was not expressly in the claim. We absolutely agree that what I'm suggesting to you is not -- these words are not in the claim. This is something that comes out of the importance of tension to this claim and the way and prominence in which they discussed their particular way of measuring tension in this sort of synopsis here of the invention. The Microsoft case that I referred to, very similar case.

THE COURT: The issue is whether that feature is inherent in what it is they are claiming or whether

what they're really saying here that this is a possible benefit of our invention is that it may allow for this without contacting the tape. If it's the latter, your argument fails on that point.

MR. GLITZENSTEIN: If it's the latter, your Honor, that's absolutely correct. This particular feature of the disclosure, the ability to monitor tension without contacting the tape was not only a sort of additional aspect but was actually the centerpiece of the UK litigation between the parties here.

I know you've got some background on that. But in the UK case, the original UK litigation, this is where they placed all the emphasis. They said it's all about -- what we really invented was figuring out a way to evaluate the tension without contacting the tape. They then turned around, and having put those features in a lot of their UK claims, they then subsequently in the U.S. tried to get them out.

Our position is given the prominence in the specifications -- and we are not relying here on the expert evidence on the UK decision, but by way of some context and background for the Court, this was a significant feature of the UK case as well and was something that they placed a lot of emphasis on. And in view of that, it is something and, again, throughout the

specification there is a lot of discussion about the benefits and advantages of having a system that doesn't contact the tape, simpler and easier.

THE COURT: I understand all that. The argument you are making is one that I haven't used before. It seems to me to be a somewhat difficult argument conceptually, and I haven't read the cases that you've cited. So I will read those cases and think about it. My general reaction is that something like this is often included in a summary of the invention as one of the benefits of the invention, but it isn't a claim limitation, and even if it's the central benefit of the invention, it's the claim terms that circumscribe the invention and it's not the benefits of the invention. So the claim isn't limited to what things that actually achieve the particular things that are specified in the brief description as the benefits of the invention.

MR. GLITZENSTEIN: I think as a general proposition that is the law, your Honor, and I think there are a few cases that say where something is sort of touted, this is more than just a benefit of the invention.

THE COURT: Inherent in the way to achieve the innovation that is at the core of the claim, this is the

innovation. And it's inherent in what's claimed and has to be a part of it.

MR. GLITZENSTEIN: That's right, and they can't now have a claim that they say covers the thing that essentially was distinguishing with this package.

THE COURT: All right. What did you want to say about that?

MR. JAKES: I believe your Honor has the law exactly right and it doesn't apply in this context. You read limitations from the specification into the claim. That's exactly what they are doing.

THE COURT: I don't even construe this as a limitation. Sometimes you will see certain embodiments that are identified and people make the mistake of arbitrarily limiting the claim language to the disclosed embodiments, and even with the change in claim construction law that occurred in the last few years, the Federal Circuit still said don't be doing that. But I don't even see this as going that far. This seems to be language that is saying our invention is great because one of the things that's good about it is you won't need to have contact with the tape surface anymore, and that's sort of one of the benefits of it. It doesn't limit the scope of the claim, unless this argument is something that's so inherent of the nature

of what is claimed that it's an essential part of it and, therefore, should be read into the claims.

MR. JAKES: That's right, your Honor. This is really a preferred embodiment. It's described as an exemplary embodiment. In fact, if you look at our Slide 51, Markem tries to add in various things, including the tape has to be measured, the motor control has to be used to measure the tape, has to be done without contacting the tape.

THE COURT: Do you have a product that does operate without measuring tension on the tape?

MR. JAKES: Well --

THE COURT: Contacting it.

MR. JAKES: Yes, we have a product that works as described in the specification that uses the control of the motors, the current that is used to drive the motors to derive a measure of tension. There's no direct measurement.

THE COURT: How does that work given the problems that people were specifying for me earlier that there's so much variation in the diameter of the tape spools that you can't do that? I thought that's what was being said to me.

MR. JAKES: Well, what you are measuring is the tension. You're not measuring the diameter of the

spools.

THE COURT: But how can you get to the tension measurement just by power on the motors without knowing something about the diameter of the tape spools?

MR. JAKES: Your Honor, I can't explain technically why that is, but I understand that the force that is necessary to adjust the tension or to measure that tension can be determined from the current that is used to supply the motors, and Professor Kuc --

THE COURT: That's what I was trying to ask before of the experts. I thought you were saying that you really can't do that reliably to measure the tension simply by knowing the amount of energy that's being supplied to the stepper motors. And one of the reasons that you can't is there's so much variability in the product and in the diameter of the tape spools; so just by knowing how much -- how many steps you are stepping one way or the other doesn't tell you anything about the -- doesn't tell you enough about the tension of the product to allow for its tension to be measured in that way. You say your product does.

MR. JAKES: It can be done. It's described in the patent specification, but that is just an exemplary embodiment. If you look at the language there on Column 4 where this is described, where the tension and the

tape is being transported, it's determined by control of the drive motors. It's not dependent upon any components. That's in the paragraph that starts "in accordance with an exemplary embodiment."

THE COURT: Yes, I understand.

MR. JAKES: It's not in the plans.

THE COURT: I understand. Okay.

MR. JAKES: Your Honor, could I address the Honeywell case briefly?

THE COURT: Yes, go ahead.

MR. JAKES: Markem's counsel said that they were looking at the term "look ahead distance." That's very different than what's going on here. In that case you are actually trying to interpret what the term "look ahead distance" means. These limitations or features that they are trying to read into the claim, there's not a hook in the claim language. They are not saying that word means these things. They're just saying they should be inserted.

THE COURT: If that's what the case is saying, that's a much more conventional question. I agree that sometimes when interpreting claim language, you have to look at what is inherent in the way that the claimed invention functions to give meaning to the claim language. I can buy that argument.

MR. JAKES: That's what it is. Figuring out what look ahead distance means is not the same thing as inserting words.

THE COURT: Let me ask Markem, since you are trying to get a declaration of noninfringement here, what other terms that we haven't yet discussed that you think are really important to have construed here?

MR. GLITZENSTEIN: We've touched on the issue of plural versus single and whether the use of the terms motors and spools in the last element is one or two. That actually is a central issue as well to the case.

THE COURT: And I didn't understand that at all until today when you got up and made your presentation. So it was useful today for me to understand that.

MR. GLITZENSTEIN: So there is -- I mean, just to sort of summarize very quickly on that, and there's a legal point that was in the briefing that I thought I might address as well on this, and that is, the claim language itself really should be the start of any point for this question since it uses plural terms; namely, motors and spools for this correction step. That should be the end of it.

Defendants have cited a couple of cases. That one is the Dayco case and the other is the Versa case

where they say, well, sometimes plural can mean not one or more, not more than one, excuse me. In fact, the Dayco case makes it very clear that -- just as a matter of straight up claim construction, Dayco states that when there is a plural term used, it says -- the quote from Dayco at 132728, in accordance with standard dictionary definitions we have held that, quote, plurality, closed quote, when used in a claim refers to two or more items absent some indication to the contrary. In both Dayco and Versa the Federal Circuit went on and said, because of the peculiar way those claims were drafted, that there were other pieces of the claim that the Court relied on to conclude that, in fact, those plural terms shouldn't be construed in that way. Those conditions just simply don't apply here, your Honor. There is nothing in these claims that would suggest in any way that motors plural and spools plural don't, in fact, refer to both the spools.

In fact, to the contrary, the rest of the claim is all about driving the motors -- or controlling the motors, excuse me, driving the spools and doing so in a particular direction; namely, a tape transport direction. Also, just to echo the point I was making earlier about Barrus, in Barrus both motors are controlled. Their theory of infringement in this case,

your Honor, is even if you are going to construe drive to mean rotate because we rotate one spool and keep the other one steady, that still meets this requirement of controlling said motors to drive the spools.

THE COURT: How? How does it meet that?

MR. GLITZENSTEIN: I don't think it does.

THE COURT: If drive means rotate and spools mean spool, how does it?

MR. GLITZENSTEIN: I don't believe it does and I think the words of the claim and the law and the prosecution history and the specifications all stand against them on this point. I don't understand the theory; that is, their theory, and that's why I wanted to just underscore it here.

They do say in their second claims construction briefing that even it -- or maybe it's their first, I'm sorry, I can't recall. But they say even if "drive" means rotate having a system where only one motor rotates and the other is held steady would still be covered and, again, we don't think that can be reconciled with the intrinsic record at all.

THE COURT: All right. Let me hear your response on that.

MR. JAKES: Your Honor, we just focus on the word "drive," and if it's given the correct meaning, the

rest of it follows.

THE COURT: I think that's right. Your argument rises or falls on that is primarily -- are there any other terms that you in particular want me to focus on here in the analysis? Because I do think this seems to me that the key issue is the drive. The meaning of drive in this context is probably what's going to be most important to the analysis, and I want to try to focus most of my effort on trying to understand that and all of your arguments concerning that.

But if there are other terms here that you think are particularly important that you need to have me address.

MR. JAKES: No, your Honor, I don't.

THE COURT: All right. Does anyone want to say anything else about any of the matters that we have discussed today?

MR. GLITZENSTEIN: Your Honor, I had just one last term that I wanted to put before the Court, and that is, it's the issue length. The claim talks -- in the final element number five talks about the controller calculating a length. And our construction of this is just simply to use the term "length." We think there's some ambiguity with the term "length," but we are

perfectly happy to --

THE COURT: Where are you exactly on the claims construction chart?

MR. GLITZENSTEIN: In the claims construction chart, be at page four, the second element. Again, we think there's some ambiguity with the issue of what length means, but we are happy to table that until invalidity considerations.

But the particular point I wanted to direct the Court to is we think that "length" is a term that needs no construction. We think that people know what "length" means. They are trying to change the word "length" to "amount," and "amount" can mean really anything as far as -- it creates the possibility of confusion as to what the scope of it is. So we submit that the word "length" really needs no construction here and it should be preserved.

THE COURT: What are you getting at there?

MR. JAKES: Your Honor, we are more than happy with length. They said the term couldn't be construed; so we gave it a meaning.

THE COURT: Oh, this is in anticipation of an argument.

MR. JAKES: They made their argument that it was indefinite, that somehow it had no meaning.

THE COURT: We'll save that for a later date.

MR. JAKES: Couldn't be construed and we are going to give it a meaning, but we are more than happy with the word "length" as it is. We think that's perfectly understandable.

MR. GLITZENSTEIN: I misunderstood the motives.

THE COURT: All right. Did you want to say anything else?

MR. JAKES: No, your Honor, I've said enough. Thank you.

THE COURT: I really appreciate the quality of the presentations today. The tutorial was very helpful. I know it's expensive to bring people in like this, but I assume there's a lot at stake for you and it certainly was helpful to me. Counsel's arguments were very well presented, very informative, and I will look very carefully at all of the arguments in your brief and the additional arguments that you've presented today.

If I've expressed a tentative view, you need to understand it's just a tentative view. I oftentimes change my mind during the course of working through something; so nobody should bank on me standing by anything I said today. I will look at each issue and consider every argument that's been made as to matters

that I think are potentially determinative of the case.

As to other matters, you are likely to find me putting in a footnote in my decision saying I will reserve judgment on that issue until it becomes relevant to me at a later date and if we need to, we can revisit those issues. I think we will all be better served if I spend my efforts focusing on what I think are the most hotly disputed claim terms and really trying to get those right, to give you as much guidance as I can as to how we are going to proceed from here.

I will get to work on that and probably be 60 to 90 days. I'm reasonably confident I will get it out before Labor Day when my clerk leaves; so he's not going to be allowed to leave until we're done with this. I will get a decision out as soon as we can.

(Concluded at 12:35 p.m.)

C E R T I F I C A T E

I, Diane M. Churas, do hereby certify that the foregoing transcript is a true and accurate transcription of the within proceedings, to the best of my knowledge, skill, ability and belief.

DIANE M. CHURAS, CSR, CRR